

General Information

This document describes the **REMMI (REmote Man Machine Interface)** modules. Its purpose is to give all the needed information to the users to set up and install the board successfully.

The REMMI concept gives the user the opportunity to connect a remote MMI (Man Machine Interface) to the **xIP – Product Family** made by MPL. The Product includes two modules that are listed below:

REMMI-T Transmitter Print
REMMI-R Receiver Print

General technical features

- PanelLink[®] transmission
- Pixel clock 25MHz up to 86MHz (XGA resolution)
- PS/2 mouse and keyboard
- RS232 interface
- USB interface
- Panel brightness and/or contrast adjustment through software or on board.
- Color depth: 24bit/pixel (RGB 3 x 8bit/pixel = 16M colors)
 36bit/2pixels (RGB 3 x 6bit/pixel = 256k colors)
- Optional, power supply from host, up to 10W



TABLE OF CONTENTS

1. INTRODUCTION.....	5
1.1 ABOUT THIS MANUAL.....	5
1.2 SAVETY PRECAUTIONS AND HANDLING.....	5
1.3 EQUIPMENT SAFETY.....	5
2. REMMI CONCEPT.....	6
2.1 BLOCKDIAGRAM	6
2.2 FEATURES.....	6
2.2.1 Interface.....	6
2.2.2 Visibility.....	6
2.2.3 Special features.....	6
3. REMMI-T.....	7
3.1 GENERAL INFORMATION	7
3.2 TECHNICAL FEATURES	7
3.3 PARTS LOCATION	7
3.4 DIP SWITCH 1 SETTINGS.....	8
3.4.1 PANELLINK® INTERFACE.....	8
3.4.2 RS232 INTERFACE	8
3.5 CONNECTORS.....	9
3.5.1 INPUT CONNECTOR.....	9
3.5.2 OUTPUT CONNECTOR.....	10
3.6 MOUNTING.....	11
3.6.1 ELECTRICAL CONSIDERATIONS.....	11
3.6.2 PARTS NEEDED FOR MOUNTING	11
3.6.3 MOUNTING DESCRIPTION	11
3.6.4 MECHANICAL DIMENSIONS	12
4. REMMI-R	13
4.1 GENERAL INFORMATION	13
4.2 TECHNICAL FEATURES	13
4.3 CONNECTOR LOCATIONS.....	14
4.4 DIP SWITCH SETTINGS.....	15
4.4.1 DIP Switch 1	15
4.4.2 DIP Switch 2	16

4.5	EXTERNAL CONNECTORS	17
4.5.1	INPUT CONNECTOR.....	17
4.5.2	LCD PANEL CONNECTOR 1 (color depth up to 24bit / pix)	18
4.5.3	LCD PANEL CONNECTOR 2 (color depth up to 36bit / 2 pix)	19
4.5.4	BACKLIGHT INVERTER CONNECTOR.....	20
4.5.5	LCD PANEL POWER CONNECTOR.....	20
4.5.6	REMMI-R POWER CONNECTOR.....	20
4.5.7	USB SINGLE TYPE A CONNECTOR.....	21
4.5.8	USB DOUBLE TYPE A CONNECTOR 1	21
4.5.9	USB DOUBLE TYPE A CONNECTOR 2	21
4.5.10	KEYBOARD CONNECTOR	22
4.5.11	MOUSE CONNECTOR	22
4.5.12	SERIAL CONNECTOR	23
4.6	BUTTONS.....	23
4.7	INTERNAL CONNECTORS	24
4.7.1	PASSIVE LCD PANEL CONNECTOR.....	24
4.7.2	TOUCH OPTION CONNECTOR.....	25
4.7.3	REMOTE BUTTON CONNECTOR	25
4.7.4	GENERAL PURPOSE SIGNALS CONNECTOR.....	26
4.8	MOUNTING.....	27
4.8.1	ELECTRICAL CONSIDERATIONS	27
4.8.2	MECHANICAL DIMENSIONS	28
4.8.2.1	CONNECTOR POSITION ON REMMI-R (FIGURE 1).....	28
4.8.2.2	CONNECTOR POSITION ON REMMI-R (FIGURE 2).....	29
4.8.2.3	HOLE POSITIONS ON REMMI-R	30
4.8.2.4	HEIGHT OF THE REMMI-R WITH SINGLE USB CONNECTOR.....	31
4.8.2.5	HEIGHT OF THE REMMI-R WITH DUAL USB CONNECTORS	31
4.9	SERIAL INTERFACE (RS232) FEATURES.....	32
4.9.1	INTRODUCTION	32
4.9.2	RS232 VOLTAGE LEVEL CONNECTORS.....	32
4.9.3	TTL VOLTAGE LEVEL CONNECTOR.....	32
4.9.4	SCHEMATIC DIAGRAM.....	32
4.10	BRIGHTNESS AND CONTRAST ADJUSTMENT	33
4.10.1	INTRODUCTION.....	33
4.10.2	ELECTRICAL CONSIDERATIONS.....	33
4.10.3	ADJUSTMENT POSSIBILITIES.....	33
4.10.3.1	ON BOARD BUTTONS ON REMMI-R	33
4.10.3.2	FROM REMOTE BUTTONS TO CONNECTOR ON REMMI-R.....	33
4.10.3.3	FROM REMOTE HOST	33
4.11	VARIABLE VOLTAGE SELECTION.....	34
4.11.1	INTRODUCTION.....	34
4.11.2	ELECTRICAL CONSIDERATIONS.....	34
4.11.3	SCHEMATIC DIAGRAM	34
4.11.4	INTENDED APPLICATION	35
4.12	TOUCH OPTION.....	36
4.12.1	INTRODUCTION.....	36
4.12.2	ELECTRICAL CONSIDERATIONS.....	36
4.13	FEATURE FLASH CONTROLLER	36

5.	TRANSMISSION CABLE	37
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5.1	PARTS	37
5.2	LENGTH.....	37
5.3	ELECTRICAL SPECIFICATION.....	37
5.3.1	PANELLINK® INTERFACE.....	37
5.3.2	USB INTERFACE.....	37
5.3.3	SERIAL INTERFACE (RS232)	38
5.3.4	PS/2 INTERFACE (MOUSE AND KEYBOARD)	38
5.3.5	REMMI-R POWER SUPPLY	39
5.3.6	VARIABLE POWER SUPPLY	39
6.	INTERNET LINKS*1	40
7.	SUPPORT INFORMATION	41
7.1	MPL AG.....	41
7.2	PRODUCTION SERIAL AND REVISION NUMBER.....	41
	COPYRIGHT AND REVISION HISTORY	44
	MANUAL REVISION INFORMATION	44
	DISCLAIMER.....	44
	TRADEMARKS.....	44

1. INTRODUCTION

1.1 ABOUT THIS MANUAL

This manual is written for use by technical personal responsible for integrating the REMMI modules into their system. The manual assists the installation procedure by providing the necessary information to handle, configure and install the REMMI modules.

The REMMI modules are designed to work with the MIP, PIP and IPC from MPL as well as any other IPC's. It is a easy procedure to set up the REMMI modules, nevertheless, before attempting any installation, please read through all applicable sections of this manual and follow the instructions herein.

1.2 SAVETY PRECAUTIONS AND HANDLING

For your personal safety and the save operation of the REMMI products, follow all the safety procedures here and in other sections of the manual.

- Power must be removed from the computer system before installing (or removing) any REMMI modules to prevent the possibility of personal injury (electrical shock!) and/or damage to the units.
- Handle the units carefully, i.e. dropping or mishandling can damage the modules.
- Read and follow all the instructions and warnings described herein.
- Keep the REMMI modules away from all sources of liquids, such as coffee cups, drinking glasses, washing facilities etc.
- Protect the REMMI modules from humidity.
- Keep this manual available for reference.

For your protection and that of the REMMI modules, disconnect the power input of the used PIP immediately if any of the following conditions exists:

- The power input cable has been damaged.
- Something has been spilt onto the modules.
- One of the REMMI modules has been damaged in any way, e.g. through dropping.
- You suspect that any module requires servicing or repair.

WARNING

There are no user-serviceable components on any of the REMMI modules!

1.3 EQUIPMENT SAFETY

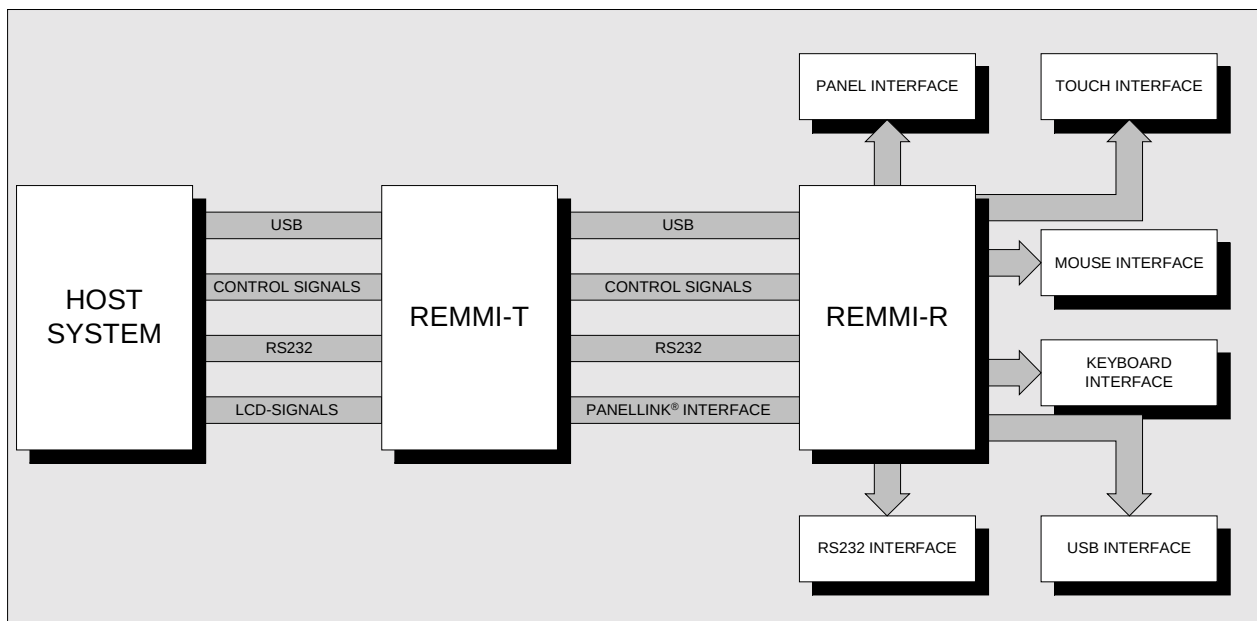
Great care is taken by MPL that all its products are thoroughly and rigorously tested before leaving the factory to ensure that they are fully operational and conform to specification. However, no matter how reliable a product, there is always the remote possibility that a defect may occur. The occurrence of a defect on this device may, under certain conditions, cause a defect to occur in adjoining and/or connected equipment. It is the users responsibility to ensure that adequate protection for such equipment is incorporated when installing this device. MPL accepts no responsibility whatsoever for such kind of defects, however caused.

2. REMMI CONCEPT

The **REMMI (REmote MMI)** concept is a Man Machine Interface that serves today needs. In industry the host system may not be at the same place as the MMI, because of the rugged environment. There REMMI concept brings a lot of flexibility with the remote MMI up to 15m. The host system can be placed in a save environment to protect the product and extend its life cycle.

The concept consists of two modules, the **REMMI-T** (transmitter, fitted into the host system) and the **REMMI-R** (receiver, placed near the LCD-Panel). and a connection cable to transmit the signals.

2.1 BLOCKDIAGRAM



2.2 FEATURES

2.2.1 Interface

- PS/2 Interface for mouse
- PS/2 Interface for keyboard
- RS232 Interface (only Rx/D, Tx/D)
- USB V1.0 Interface (for cable length up to 5m)
- Optional, USB(V1.1) Hub 1:4^{*1}

2.2.2 Visibility

- Up to XGA resolution (1024x768 pixel)
- Up to 24bit/pix RGB for 16M colors
- Up to 36bit/2pix RGB for 260K colors
- Supports TFT, DSTN panels
- Adjustable brightness
- 3.3V and 5V LCD panel supported

2.2.3 Special features

- Option. external power supply for large panel; (power requirement > 10W)
- Option, flash controller for customer applications^{*2}
- Option, touch panel^{*3}

Note: ^{*1}: USB Hub 1:4, (one upstream, 4 downstream)

^{*2}: Flash controller is also used by MPL

^{*3}: The touch panel controller can either use the RS232 lines (Rx/D, Tx/D) or the PS/2 mouse interface for communication with the host system

3. REMMI-T

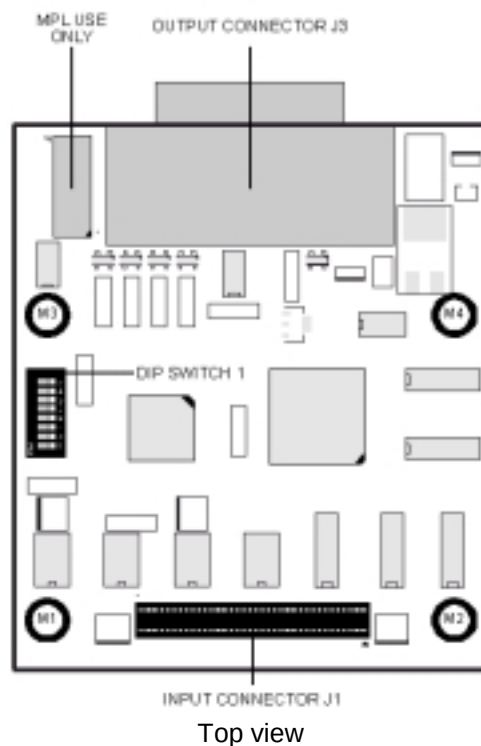
3.1 GENERAL INFORMATION

The **REMMI-T** is the transmitter board that can be used with the MPL Products and the REMMI connector or other systems with accurate wiring. The input signals from the VGA controller are converted and sent to the receiver using the PanelLink technology^{*1}.

3.2 TECHNICAL FEATURES

- Input signals; 3.3V and 5V compatible
- Up 24bit color/pixel input signals
- Variable voltage selection^{*2}
- Hardware on/off RS232 lines to receiver
- ESD protected PanelLink signals; by pairs
- ESD protected USB lines; by pairs
- ESD protected RS232 lines; Rx/D, Tx/D
- ESD protected PS/2 lines for mouse and keyboard
- Board dimensions (65 x 75mm)

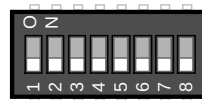
3.3 PARTS LOCATION



Note: *1: For more information please refer to the Silicon Image homepage in section 6 "INTERNET LINKS".
 *2: For more information please refer to section: VARIABLE VOLTAGE SELECTION" 4.11.

3.4 DIP SWITCH 1 SETTINGS

Default switch settings are in brackets.



3.4.1 PANELLINK® INTERFACE

SW1-1	Latching Edge Data And Control Signals
(ON)	Latching on falling edge of clock
OFF	Latching on rising edge of clock
SW1-2	Reserved Function
ON	Reserved
(OFF)	Reserved
SW1-3	Hardware ^{*1} Power down Mode PanelLink® Controller
ON	Enabled
(OFF)	Disabled (normal operation)
SW1-4	Software ^{*2} Power down Mode PanelLink® Controller
ON	Enabled
(OFF)	Disabled
SW1-5	Reserved Function
ON	Reserved
(OFF)	Reserved
SW1-8	Adjustable Voltage Swing For PanelLink® Transmission ^{*3}
ON	High voltage swing
(OFF)	Low voltage swing

3.4.2 RS232 INTERFACE

SW1-6	RS232 Transmitter Line (TxD) Connection To Output Connector
(ON)	Enabled
OFF	Disabled
SW1-7	RS232 Receiver Line (RxD) Connection To Output Connector
(ON)	Enabled
OFF	Disabled

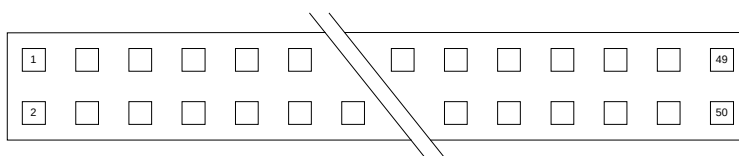
- Note:
- *1: If the "Hardware Power down Mode" is enabled, the PanelLink® Controller is turned off.
 - *2: If the "Software Power down Mode" is enabled, the PanelLink® Controller is turned off, while the PD# input signal is LOW.
 - *3: For more information about the "Voltage Swing For PanelLink® Transmission", please refer to the Datasheet (DS-0001-B) on the Silicon Image Homepage; see "INTERNET LINKS" section 6.

3.5 CONNECTORS

3.5.1 INPUT CONNECTOR

The input connector is a 50pin (1,27 x 2,54mm) female connector.

Pin	Signal	Description	Pin	Signal	Description
1	RE_D6	Color red data bit 6	26	HSYNC	Control signal horizontal sync
2	RE_D7	Color red data bit 7 (MSB)	27	CLOCK	Data clock
3	RE_D4	Color red data bit 4	28	DE	Control signal data enable
4	RE_D5	Color red data bit 5	29	CTRL2	GPIO signal for future use
5	RE_D2	Color red data bit 2	30	CTRL3	GPIO signal for future use
6	RE_D3	Color red data bit 3	31	VCC3	+3.3V
7	RE_D0	Color red data bit 0 (LSB)	32	PD#	Power down signal
8	RE_D1	Color red data bit 1	33	VCC	+5V
9	GR_D6	Color green data bit 6	34	VCC	+5V
10	GR_D7	Color green data bit 7 (MSB)	35	KCLK	Keyboard clock
11	GR_D4	Color green data bit 4	36	KDATA	Keyboard data
12	GR_D5	Color green data bit 5	37	MCLK	Mouse clock
13	GR_D2	Color green data bit 2	38	MDATA	Mouse data
14	GR_D3	Color green data bit 3	39	PG	Power good signal
15	GR_D0	Color green data bit 0 (LSB)	40	PD0	Control signal 1 for voltage selection
16	GR_D1	Color green data bit 1	41	PD1	Control signal 2 for voltage selection
17	BL_D6	Color blue data bit 6	42	USB+	USB+ signal
18	BL_D7	Color blue data bit 7 (MSB)	43	USB-	USB- signal
19	BL_D4	Color blue data bit 4	44	VCC_VAR	Variable power line
20	BL_D5	Color blue data bit 5	45	VCC_VAR	Variable power line
21	BL_D2	Color blue data bit 2	46	VCC_VAR	Variable power line
22	BL_D3	Color blue data bit 3	47	VCC_VAR	Variable power line
23	BL_D0	Color blue data bit 0 (LSB)	48	VCC_VAR	Variable power line
24	BL_D1	Color blue data bit 1	49	RXD	RS232 host receiver
25	VSYNC	Control signal vertical sync	50	TXD	RS232 host transmitter



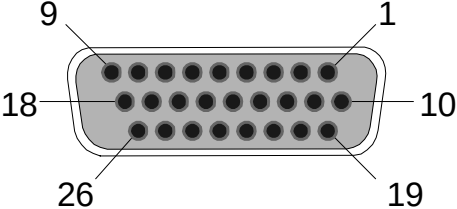
Samtec RSM-125-02-L-D 50pin (1,27 x 2,54mm) female connector

Special signal description:

- The two general purpose signals (CTRL2, CTRL3) are not usable for time critical functions, because they are transmitted to the receiver over the Panellink® interface. For more information please refer to the Silicon Image Homepage; see "INTERNET LINKS" section 6.
- PD# (active low signal) can be used either to turn off the **REMMI-T** Panellink® Controller (SW1-4 = On) or to shutdown the backlight inverter connected to the **REMMI-R** board.
- The signals PD0, PD1 and PG are used for the function "VARIABLE VOLTAGE SELECTION" section 4.11.

3.5.2 OUTPUT CONNECTOR

The output connector is a HD-SUB 26 pin female connector.

Pin number	Signal	Description	Pinout
1	PL_G-	PanelLink green- signal	
2	PL_B-	PanelLink blue- signal	
3	GND	Signal ground	
4	KDATA	Keyboard data line	
5	KCLOCK	Keyboard clock line	
6	MDATA	Mouse data line	
7	MCLOCK	Mouse clock line	
8	VCC_VAR	Variable power supply	
9	RXD	RS232 host receiver line (DTE)	
10	PL_R-	PanelLink red- signal	
11	PL_G+	PanelLink green+ signal	
12	PL_CL-	PanelLink clock- signal	
13	VCC	+ 5V	
14	VCC	+ 5V	
15	GND_VAR	Variable ground	
16	VCC_VAR	Variable power supply	
17	GND_VAR	Variable ground	
18	TXD	RS232 host transmitter line (DTE)	
19	PL_R+	PanelLink red+ signal	
20	PL_B+	PanelLink blue+ signal	
21	PL_CL+	PanelLink clock+ signal	
22	GND	Signal ground	
23	USB-	USB- line	
24	USB+	USB+ line	
25	GND_VAR	Variable ground	
26	VCC_VAR	Variable power supply	

HD-Sub 26 pin female connector

Special signal description:

- VCC_VAR is the output voltage for the function described in "VARIABLE VOLTAGE SELECTION" section 4.11.

3.6 MOUNTING

This chapter provides the procedure for mounting the **REMMI-T** module. If you mount the **REMMI-T** module yourself into a system, MPL accepts no responsibility for any damage that results to that system or the **REMMI-T** module.

WARNING

Before commencing, verify that the host system is switched off and disconnected from the main power. Review and observe the safety precautions description at the beginning of this manual to avoid personal injury or damage to equipment.

3.6.1 ELECTRICAL CONSIDERATIONS

There are four holes to mount the REMMI-T module to a base board. The same are also used for GROUND connection. Therefore, the distance pieces to the base board must be electrical conductive. For proper operation use all four mounting holes and connect them to the correct ground potential.

IMPORTANT

If you don't connect all four mounting holes to the appropriate ground potential on the base board, the REMMI-T and / or the REMMI-R can be damaged.

M1	GND for onboard logic voltage; +5V
M2	GND_VAR ^{*1}
M3	ESD – GND
M4	ESD – GND

3.6.2 PARTS NEEDED FOR MOUNTING

- **REMMI-T** module
- 4 x M2.5 x 4mm security screws
- 4 x Distant connector pieces

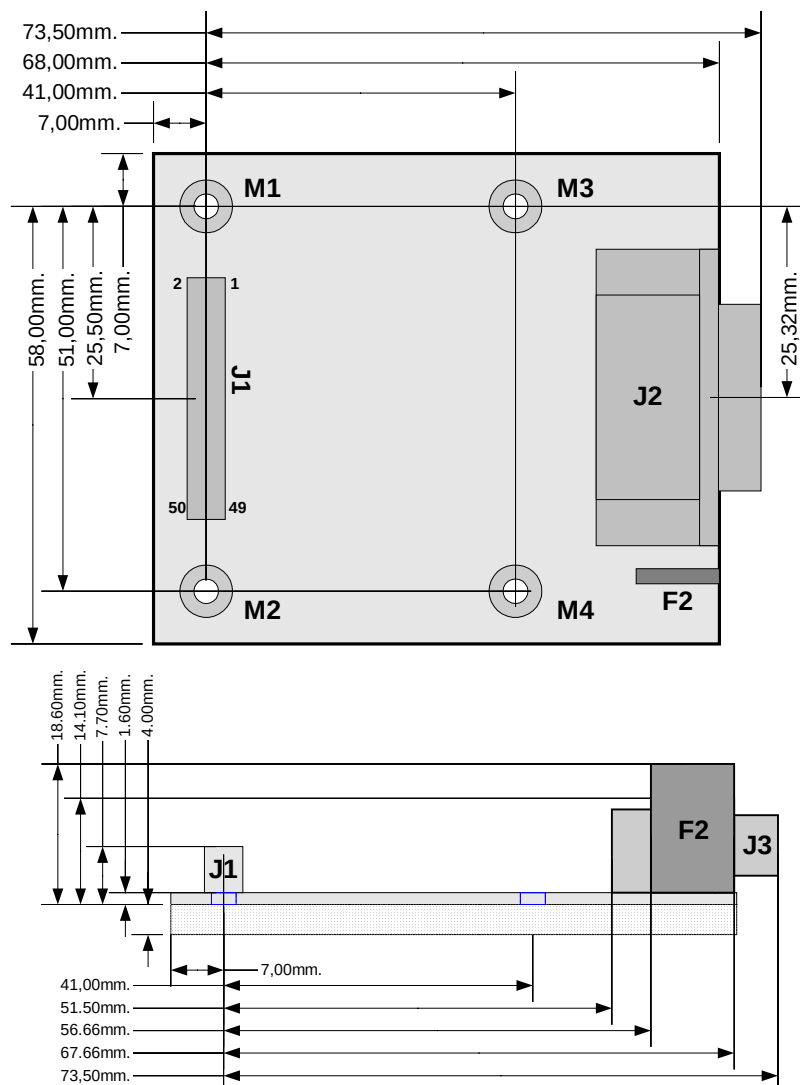
3.6.3 MOUNTING DESCRIPTION

1. Plug the **REMMI-T** module to its place^{*2}.
2. Insert and secure the screws at the mounting holes. All 4 mounting holes must be screwed tight.

3. Insert and secure the screws at the mounting holes. All 4 screws must be tighten well because the GND, GND_VAR and ESD_GND connections are made via the screw connection.

Note: *1: Refer to "VARIABLE VOLTAGE SELECTION", section 4.11 for more information.
 *2: Please refer to the PIP manual for the REMMI-T mounting location.

3.6.4 MECHANICAL DIMENSIONS



J1 = INPUT CONNECTOR
J3 = OUTPUT CONNECTOR
F2 = FUSE VCC_VAR

4. REMMI-R

4.1 GENERAL INFORMATION

The **REMMI-R** is the receiver board, generally used together with the **REMMI-T**, to complete the **REmote MMI** concept. However the **REMMI-R** can also be used with limited functionality in connection with other **PanelLink®** Transmitters as well. The received data from the transmitter board, using the **PanelLink®** technology for transmission, is transformed and send to the LCD-Panel.

4.2 TECHNICAL FEATURES

- Board dimensions (122 x 168mm)
- No extern power supply needed for panels up to 10W max. power
- Extern power supply for panels with more than 10W
- PS/2 mouse and keyboard interface
- USB interface, connector type A (cable length restricted to 5m, USB Specification 1.0)
- RS232 interface
- Supports 3.3V and 5V LCD panels
- Supports TFT panels up to XGA resolution
- Supported color resolution:
max. 24bit color (3 x 8bit RGB/pixel) one pixel/clock
max. 36bit color (3 x 6bit RGB/pixel) two pixel/clock
- Brightness and contrast adjustment possibilities:
on board with push buttons
remote and connected to the right connector on the REMMI-R
from the host system (Option)
- Selectable backlight inverter voltage^{*1}
- 15W max. power consumption^{*2}

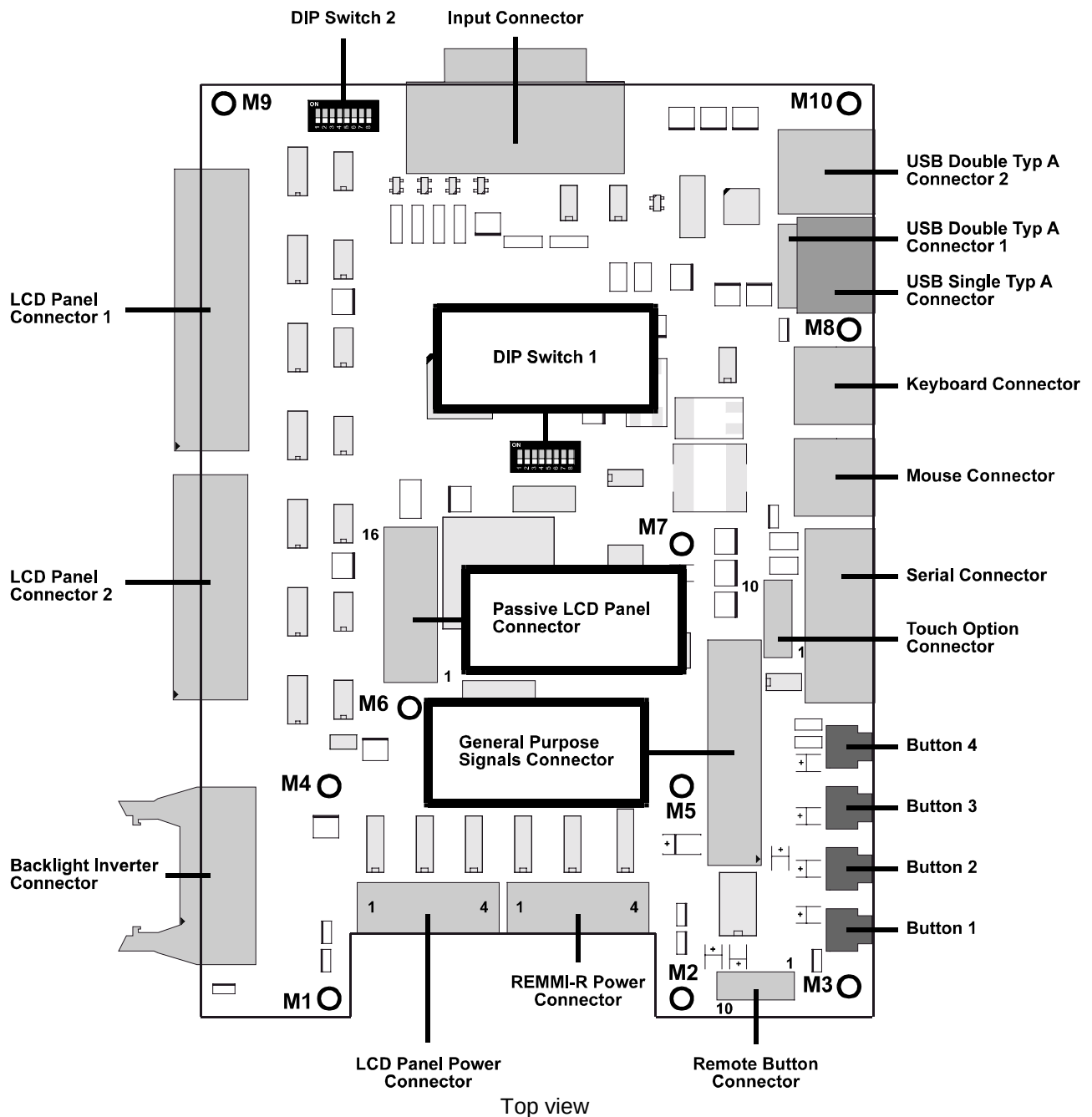
Options:

- Flash controller AT89S8252 (2kB EEPROM, 8kB Flash, 256Byte RAM, 11GPIO)
- USB hub 1:4 with four USB connectors type A (cable length restricted to 5m, USB Specification 1.1)
- Supports STN, DSTN
- Contrast voltage adjustment from either 0 to -20V or from 0.5 to 20V

Note: *1: Refer to the Section "VARIABLE VOLTAGE SELECTION" section 4.11.

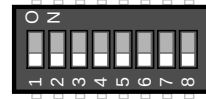
 *2: Attached periphery: PS/2 mouse and keyboard, lg.philips LCD, LP064V1 (640 x 480) panel

4.3 CONNECTOR LOCATIONS



4.4 DIP SWITCH SETTINGS

Default switch settings are in brackets.



4.4.1 DIP Switch 1

SW1-1	SW1-2	Mode Select of the RS232 to TTL Converter, Hardware Control ^{*1}
ON	ON	TxOUT = Tri-state; RxOUT = Active ^{*2}
(ON)	(OFF)	TxOUT = Active; RxOUT = Active
OFF	ON	TxOUT = Tri-state; RxOUT = Tri-state
OFF	OFF	TxOUT = Active; RxOUT = Tri-state
SW1-3		Reserved Function
ON		Reserved
(OFF)		Reserved
SW1-4		RS232 to TTL Converter, Control Select ^{*3}
ON		Flash controller controlled (Option)
(OFF)		DIP switch controlled (SW1-1, SW1-2)
SW1-5		TTL Serial Interface
(ON)		Connection to "General Purpose Signals Connector"
OFF		Connection to flash controller (DCE)
SW1-6		Reserved Function
ON		Reserved
(OFF)		Reserved
SW1-7	SW1-8	Voltage VCC_VAR Selection ^{*4}
ON	ON	5V ±5%
ON	OFF	TBD
OFF	ON	8V – 28V ±10%
(OFF)	(OFF)	TBD

- Note:
- *1: The switch SW1-1 and SW1-2 select the mode of the RS232 to TTL converter on the REMMI-R if the switch SW1-4 is OFF. Otherwise the mode is selected through the flash controller (future option).
 - *2: TxOUT TTL to RS232 conversion, RxOUT RS232 to TTL conversion; TxOUT = Rx D direction DTE, RxOUT = Tx D direction DTE (Data Terminal Equipment, host controller)
 - *3: The mode selection of the RS232 to TTL converter can be done, either through the DIP switch SW1-1 and SW1-2 or the flash controller (future option), according to the SW1-4 setting.
 - *4: Refer to the Section "VARIABLE VOLTAGE SELECTION" for more information.

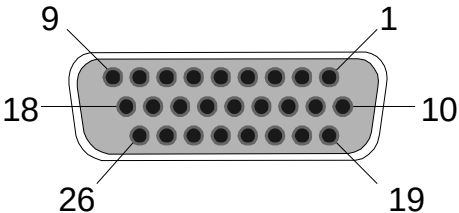
4.4.2 DIP Switch 2

SW2-1	LCD Panel Data Latch
(ON)	Falling edge (normal operation)
OFF	Rising edge
SW2-2	Pixel Per Clock Selection
(ON)	One pixel/clock (up to 24 bit/pixel)
OFF	Two pixel/clock (up to 18 bit/pixel)
SW2-3	Panel Type Selection ^{*1}
(ON)	TFT panels
OFF	DSTN panels
SW2-4	Output Driver Strength
(ON)	Low
OFF	High
SW2-5	Reserved Function
ON	Reserved
(OFF)	Reserved
SW2-6	Reserved Function
ON	Reserved
(OFF)	Reserved
SW2-7	Reserved Function
ON	Reserved
(OFF)	Reserved
SW2-8	Reserved Function
ON	Reserved
(OFF)	Reserved

Note: *1: For more information refer to the Datasheet (Sil/DS-0004-B) on the Silicon Image Homepage; see "INTERNET LINKS" section 6.

4.5 EXTERNAL CONNECTORS

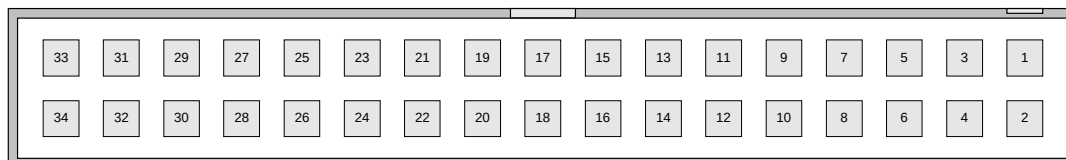
4.5.1 INPUT CONNECTOR

Pin number	Signal	Description	Pinout
1	PL_G-	PanelLink® green- signal	
2	PL_B-	PanelLink® blue- signal	
3	GND	Signal ground	
4	KDATA	Keyboard data line	
5	KCLOCK	Keyboard clock line	
6	MDATA	Mouse data line	
7	MCLOCK	Mouse clock line	
8	VCC_VAR	Variable power supply	
9	RXD	RS232 host receiver line (DTE)	
10	PL_R-	PanelLink® red- signal	
11	PL_G+	PanelLink® green+ signal	
12	PL_CL-	PanelLink® clock- signal	
13	VCC	+ 5V	
14	VCC	+ 5V	
15	GND_VAR	Variable ground	
16	VCC_VAR	Variable power supply	
17	GND_VAR	Variable ground	
18	TXD	RS232 host transmitter line (DTE)	
19	PL_R+	PanelLink® red+ signal	
20	PL_B+	PanelLink® blue+ signal	
21	PL_CL+	PanelLink® clock+ signal	
22	GND	Signal ground	
23	USB-	USB- line	
24	USB+	USB+ line	
25	GND_VAR	Variable ground	
26	VCC_VAR	Variable power supply	

HD-Sub 26 pin female connector

4.5.2 LCD PANEL CONNECTOR 1 (color depth up to 24bit / pix)

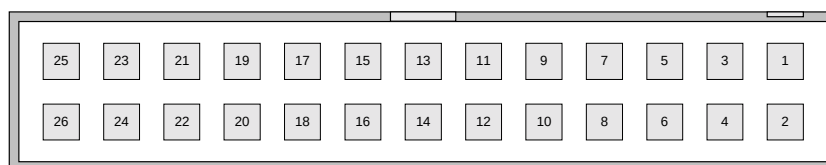
Pin	Signal	Description	Pin	Signal	Description
1	BL0_E	Color blue bit 0 (LSB) pix even	18	GR7_E	Color green bit 7 (MSB) pix even
2	BL1_E	Color blue bit 1 pix even	19	VCC_PANEL	Panel signal power
3	BL2_E	Color blue bit 2 pix even	20	GND_PANEL	Panel signal ground
4	BL3_E	Color blue bit 3 pix even	21	RE0_E	Color red bit 0 pix even
5	BL4_E	Color blue bit 4 pix even	22	RE1_E	Color red bit 1 pix even
6	BL5_E	Color blue bit 5 pix even	23	RE2_E	Color red bit 2 pix even
7	BL6_E	Color blue bit 6 pix even	24	RE3_E	Color red bit 3 pix even
8	BL7_E	Color blue bit 7 (MSB) pix even	25	RE4_E	Color red bit 4 pix even
9	VCC_PANEL	Panel signal power	26	RE5_E	Color red bit 5 pix even
10	GND_PANEL	Panel signal ground	27	RE6_E	Color red bit 6 pix even
11	GR0_E	Color green bit 0 pix even	28	RE7_E	Color red bit 7 (MSB) pix even
12	GR1_E	Color green bit 1 pix even	29	CONTRAST	Analog contrast voltage ^{*1}
13	GR2_E	Color green bit 2 pix even	30	GND_PANEL	Panel signal ground
14	GR3_E	Color green bit 3 pix even	31	HSYNC	Horizontal synch.
15	GR4_E	Color green bit 4 pix even	32	VSNC	Vertical synch.
16	GR5_E	Color green bit 5 pix even	33	CLK	Pixel clock
17	GR6_E	Color green bit 6 pix even	34	DE	Data enable



Male header 34 pin (2.54 x 2.54mm)

4.5.3 LCD PANEL CONNECTOR 2 (color depth up to 36bit / 2 pix)

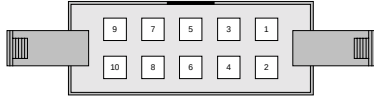
Pin	Signal	Description	Pin	Signal	Description
1	BL0_O	Color blue bit 0 (LSB) pix odd	14	GR3_O	Color green bit 3 pix odd
2	BL1_O	Color blue bit 1 pix odd	15	GR4_O	Color green bit 4 pix odd
3	BL2_O	Color blue bit 2 pix odd	16	GR5_O	Color green bit 5 pix odd
4	BL3_O	Color blue bit 3 pix odd	17	GR6_O	Color green bit 6 pix odd
5	BL4_O	Color blue bit 4 pix odd	18	GR7_O	Color green bit 7 (MSB) pix odd
6	BL5_O	Color blue bit 5 pix odd	19	RE0_O	Color red bit 0 pix odd
7	BL6_O	Color blue bit 6 pix odd	20	RE1_O	Color red bit 1 pix odd
8	BL7_O	Color blue bit 7 (MSB) pix odd	21	RE2_O	Color red bit 2 pix odd
9	VCC_PANEL	Panel signal power	22	RE3_O	Color red bit 3 pix odd
10	GND_PANEL	Panel signal ground	23	RE4_O	Color red bit 4 pix odd
11	GR0_O	Color green bit 0 pix odd	24	RE5_O	Color red bit 5 pix odd
12	GR1_O	Color green bit 1 pix odd	25	RE6_O	Color red bit 6 pix odd
13	GR2_O	Color green bit 2 pix odd	26	RE7_O	Color red bit 7 (MSB) pix odd



Male header 13 pin (2.54 x 2.54mm)

Note: *1: For more information refer to: "BRIGHTNESS AND CONTRAST ADJUSTMENT" section 4.10.

4.5.4 BACKLIGHT INVERTER CONNECTOR

Pin number	Signal	Description	Pinout
1	VCC_BL	Backlight inverter power supply	 Male header 10 pin bolted
2	VCC_BL	Backlight inverter power supply	
3	VCC_BL	Backlight inverter power supply	
4	ON / OFF_BL	Backlight inverter ON/OFF ^{*1}	
5	ON / OFF_BL	Backlight inverter ON/OFF	
6	NC		
7	BRIGHTNESS	Analog brightness adjustment ^{*2}	
8	GND_BL	Backlight inverter ground	
9	GND_BL	Backlight inverter ground	
10	GND_BL	Backlight inverter ground	

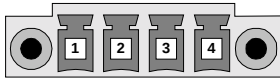
4.5.5 LCD PANEL POWER CONNECTOR

If the panel exceeds 10W, the power supply must be provided from an external source. If you connect an external power supply, be aware, that the applied power is connected right to the backlight inverter (pin 1 and 2) and the LCD panel (pin 3 and 4).

WARNING

The backlight inverter as well as the LCD panel may be damaged if the wrong voltage level is applied.

MPL is not liable for any damage to the system or the attached peripherals resulting from the wrong applied voltage level to this connector.

Pin number	Signal	Description	Pinout
1	VCC_BL	Input power backlight inverter	 LCD panel power connector
2	GND_BL	Input ground backlight inverter	
3	RESERVED	Reserved for future use	
4	RESERVED	Reserved for future use	

4.5.6 REMMI-R POWER CONNECTOR

The VCC_VAR and the GND_VAR signal are used to supply the backlight inverter with power up to 10W. For further information see section 4.11 "VARIABLE VOLTAGE SELECTION".

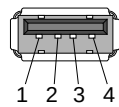
Pin number	Signal	Description	Pinout
1	VCC_VAR	Variable power supply	 REMMI-R power connector
2	GND_VAR	Variable ground	
3	VCC	+5V	
4	GND	Ground	

Note: ^{*1}: The backlight inverter is turned on if ON / OFF_BL is at 5V.

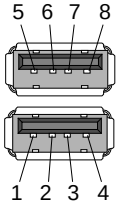
^{*2}: For more information please refer to: "BRIGHTNESS AND CONTRAST ADJUSTMENT" in section 4.10.

4.5.7 USB SINGLE TYPE A CONNECTOR

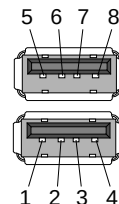
The USB interface is according to the USB specification Rev.1.0 implemented. The cable length of the USB connection is up to 5m, according to the USB specification.

Pin number	Signal	Description	Pinout
1	VCC	Cable Power +5V	 1 2 3 4 USB Type A
2	-Data	Balanced Data Line -	
3	+Data	Balanced Data Line +	
4	GND	Cable Ground	

4.5.8 USB DOUBLE TYPE A CONNECTOR 1

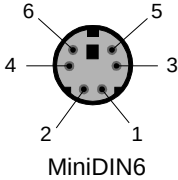
Pin number	Signal	Description	Pinout
1	VCC1	Port 0 Cable Power +5V	 5 6 7 8 1 2 3 4 Dual USB (Type A)
2	-Data1	Port 0 Balanced Data Line -	
3	+Data1	Port 0 Balanced Data Line +	
4	GND1	Port 0 Cable Ground	
5	VCC2	Port 1 Cable Power +5V	
6	-Data2	Port 1 Balanced Data Line -	
7	+Data2	Port 1 Balanced Data Line +	
8	GND2	Port 1 Cable Ground	

4.5.9 USB DOUBLE TYPE A CONNECTOR 2

Pin number	Signal	Description	Pinout
1	VCC3	Port 3 Cable Power +5V	 5 6 7 8 1 2 3 4 Dual USB (Type A)
2	-Data3	Port 3 Balanced Data Line -	
3	+Data3	Port 3 Balanced Data Line +	
4	GND3	Port 3 Cable Ground	
5	VCC4	Port 4 Cable Power +5V	
6	-Data4	Port 4 Balanced Data Line -	
7	+Data4	Port 4 Balanced Data Line +	
8	GND4	Port 4 Cable Ground	

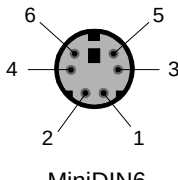
4.5.10 KEYBOARD CONNECTOR

PS/2 keyboard interface.

Pin number	Signal	Description	Pinout
1	KDAT	Keyboard data	 MiniDIN6
2	NC	Not connected	
3	GND	Ground	
4	VCC	+5V	
5	KCLK	Keyboard clock	

4.5.11 MOUSE CONNECTOR

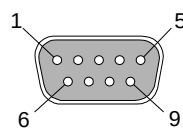
PS/2 mouse interface. Do not connect a device to this connector, if the touch option^{*1} over PS/2 is used.

Pin number	Signal	Description	Pinout
1	MDAT	Mouse data	 MiniDIN6
2	NC	Not connected	
3	GND	Ground	
4	VCC	+5V	
5	MCLK	Mouse clock	

Note: *1: For more information see the section 4.12"TOUCH OPTION".

4.5.12 SERIAL CONNECTOR

The serial interface (RS232 interface) has no handshake and control signals. Do not connect a device to this connector if the onboard RS232 controller^{*1} is used with the host system.

Pin number	Signal	Description	Pinout
1	NC	Not connected	 DSUB9 male connector
2	RXD	Receive data	
3	TXD	Transmit data ^{*2}	
4	NC	Not connected	
5	GND	Ground	
6	NC	Not connected	
7	NC	Not connected	
8	NC	Not connected	
9	NC	Not connected	

4.6 BUTTONS

The buttons 1 – 4 are used for contrast and/or brightness^{*3} adjustment.

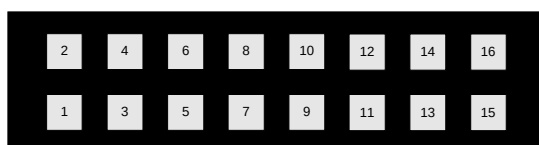
Button number	Signal	Description
Button 1	BRI_POS	Increase brightness
Button 2	BRI_NEG	Decrease brightness
Button 3	CON_POS	Increase contrast (used mainly for DSTN panels)
Button 4	CON_NEG	Decrease contrast (used mainly for DSTN panels)

Note: *1: For more information about all the possible features using the serial interface refer to section 4.9 "SERIAL INTERFACE (RS232) FEATURE".
 *2: RxD and TxD for DTE (Data Terminal Equipment).
 *3: See "BRIGHTNESS AND CONTRAST ADJUSTMENT" section 4.10.

4.7 INTERNAL CONNECTORS

4.7.1 PASSIVE LCD PANEL CONNECTOR

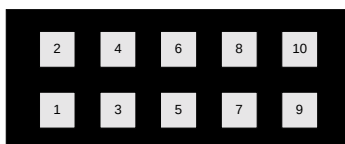
Pin number	Signal	Description
1	VCC	+ 5V
2	VCC_PANEL	Power LCD panel
3	VCC_PANEL	Power LCD panel
4	RESERVED	Do not connect
5	RESERVED	Do not connect
6	RESERVED	Do not connect
7	RESERVED	Do not connect
8	SDA	Flash controller port0 pin1
9	SCL	Flash controller port0 pin2
10	RESERVED	Do not connect
11	RESERVED	Do not connect
12	RESERVED	Do not connect
13	GND	Ground
14	GND	Ground
15	GND	Ground
16	GND	Ground



Passive LCD panel connector

4.7.2 TOUCH OPTION CONNECTOR

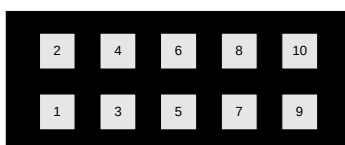
Pin number	Signal	Description
1	NC	Not connected
2	NC	Not connected
3	RxD	Receive data ^{*1}
4	MCLK	PS/2 mouse clock
5	TxD	Transmit data ^{*1}
6	MDATA	PS/2 mouse data
7	VCC	+ 5V
8	NC	Not connected
9	GND	Ground
10	NC	Not connected



Touch option connector

4.7.3 REMOTE BUTTON CONNECTOR

Pin number	Signal	Description
1	BRI_POEXT	Remote, increase brightness
2	BRI_NEGEXT	Remote, decrease brightness
3	CON_POEXT	Remote, increase contrast
4	CON_NEGEXT	Remote, decrease contrast
5	VCC	+ 5V
6	GND	Ground
7	VCC3	+ 3.3V
8	GND	Ground
9	SDA	Flash controller port0 pin1
10	SCL	Flash controller port0 pin2

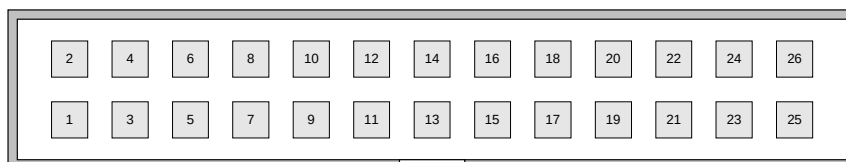


Remote button connector

Note: *1: RxD and TxD for DTE (Data Terminal Equipment).

4.7.4 GENERAL PURPOSE SIGNALS CONNECTOR

Pin number	Signal	Description
1	VCC	+ 5V
2	VCC3	+ 3.3V
3	FP3.2	Flash controller port3 pin2
4	FP3.3	Flash controller port3 pin3
5	FP3.4	Flash controller port3 pin4
6	FP3.5	Flash controller port3 pin5
7	FP3.6	Flash controller port3 pin6
8	FP3.7	Flash controller port3 pin7
9	TxD	RS232 transmit signal TTL level (DCE)
10	RxD	RS232 receive signal TTL level (DCE)
11	FTxD	Flash controller port3 pin1
12	FRxD	Flash controller port3 pin0
13	RESERVED	Do not connect
14	RESERVED	Do not connect
15	RESERVED	Do not connect
16	GND	Ground
17	VCC	+ 5V
18	MPL USE ONLY	Do not connect
19	MPL USE ONLY	Do not connect
20	MPL USE ONLY	Do not connect
21	MPL USE ONLY	Do not connect
22	FMOSI	Flash controller port1 pin5
23	FMISO	Flash controller port1 pin6
24	FCLK	Flash controller port1 pin7
25	FRST	Flash controller reset
26	GND	Ground



General purpose signals connector

4.8 MOUNTING

This chapter provides the procedure for mounting the **REMMI-R** module. The mounting holes are placed in a way, that the **REMMI-R** module fits direct on the back of the LP064V1, a 6.4" TFT panel from Lucky Goldstar (LG). Other LCD displays can be certainly mounted as well. If you mount the **REMMI-R** module yourself into a system, MPL accepts no responsibility for any damage that result to that system or the **REMMI-R** module.

WARNING

Before commencing, verify that REMMI-R is switched off and disconnected from all powers. Review and observe the safety precautions description at the beginning of this manual to avoid personal injury or damage to equipment.

4.8.1 ELECTRICAL CONSIDERATIONS

There are six holes on the **REMMI-R** to be used for mounting the module. The other four holes are either connected to ground (shouldn't be used because of possible ground loop connections) or are reserved for future use.

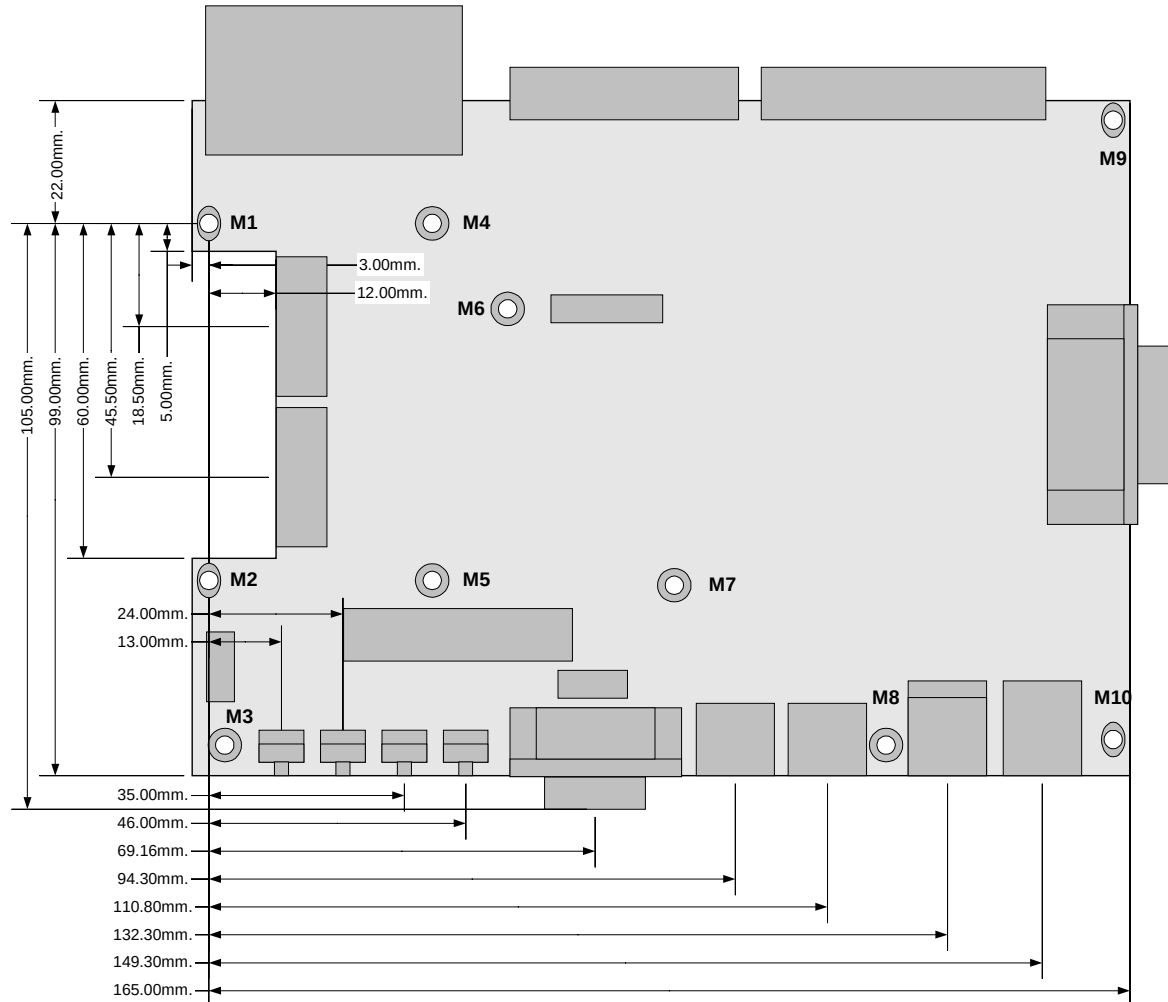
IMPORTANT

Do not use the holes connected to the ground for mounting the REMMI-R modules. A resulting ground loop can disturb the data transmission and result in a nonfunctioning system.

M1	ESD – GND connection, mounting hole
M2	ESD – GND connection, mounting hole
M3	ESD – GND connection, mounting hole
M4	Not connected, reserved for future use
M5	Not connected, reserved for future use
M6	GND connection, no mounting hole
M7	GND connection, no mounting hole
M8	ESD – GND connection, mounting hole
M9	ESD – GND connection, mounting hole
M10	ESD – GND connection, mounting hole

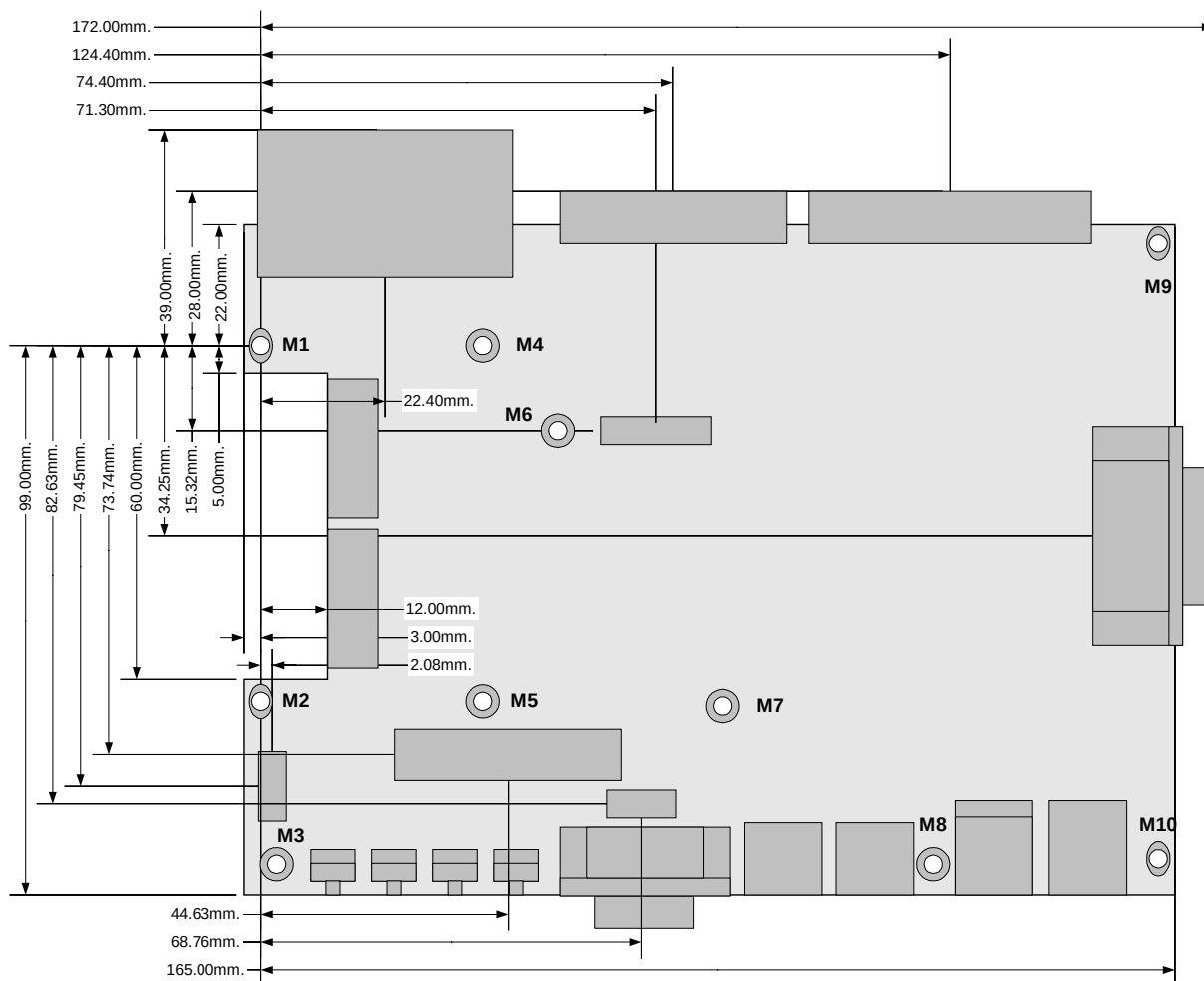
4.8.2 MECHANICAL DIMENSIONS

4.8.2.1 CONNECTOR POSITION ON REMMI-R (FIGURE 1)



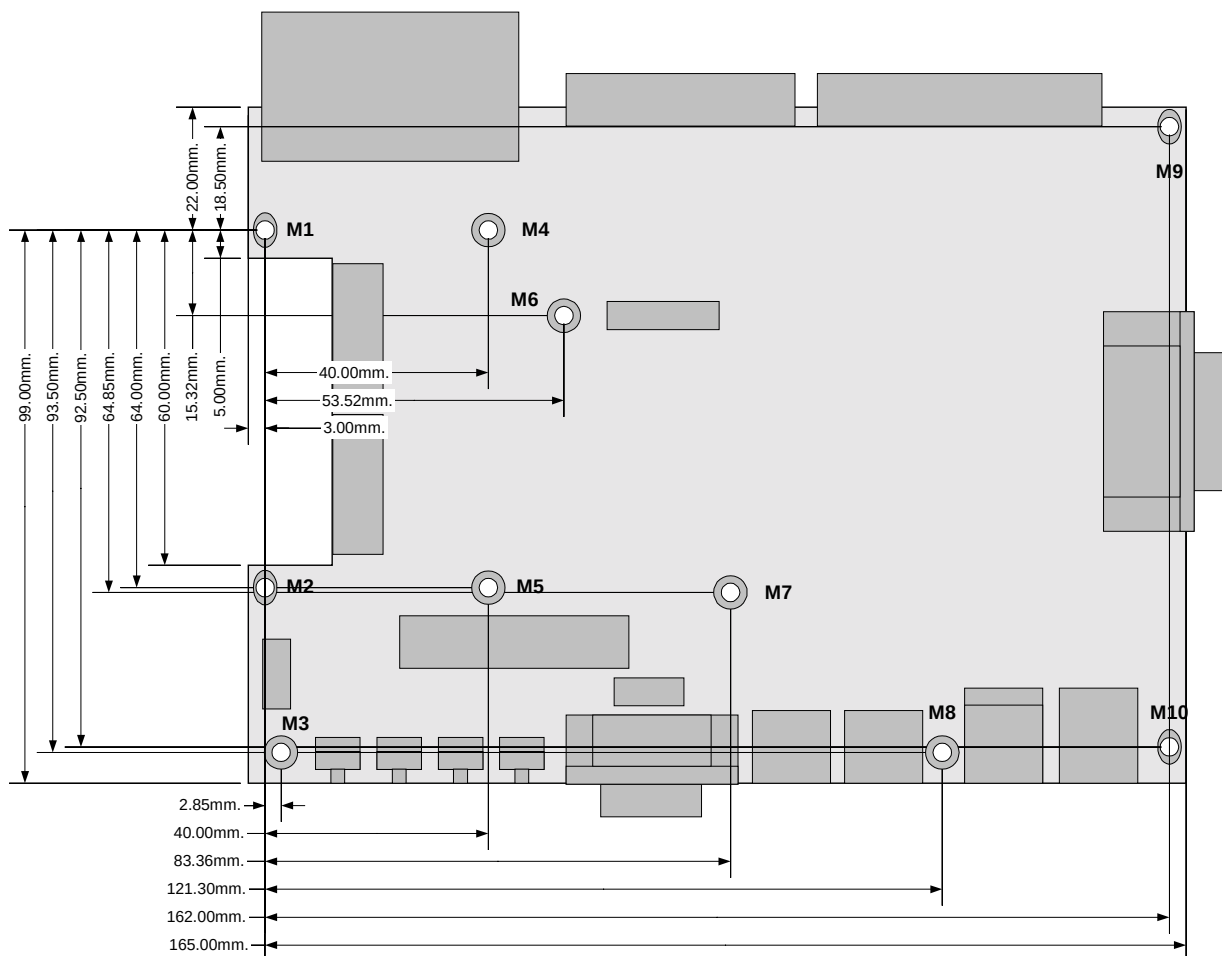
Connector position on REMMI-R, figure 1

4.8.2.2 CONNECTOR POSITION ON REMMI-R (FIGURE 2)



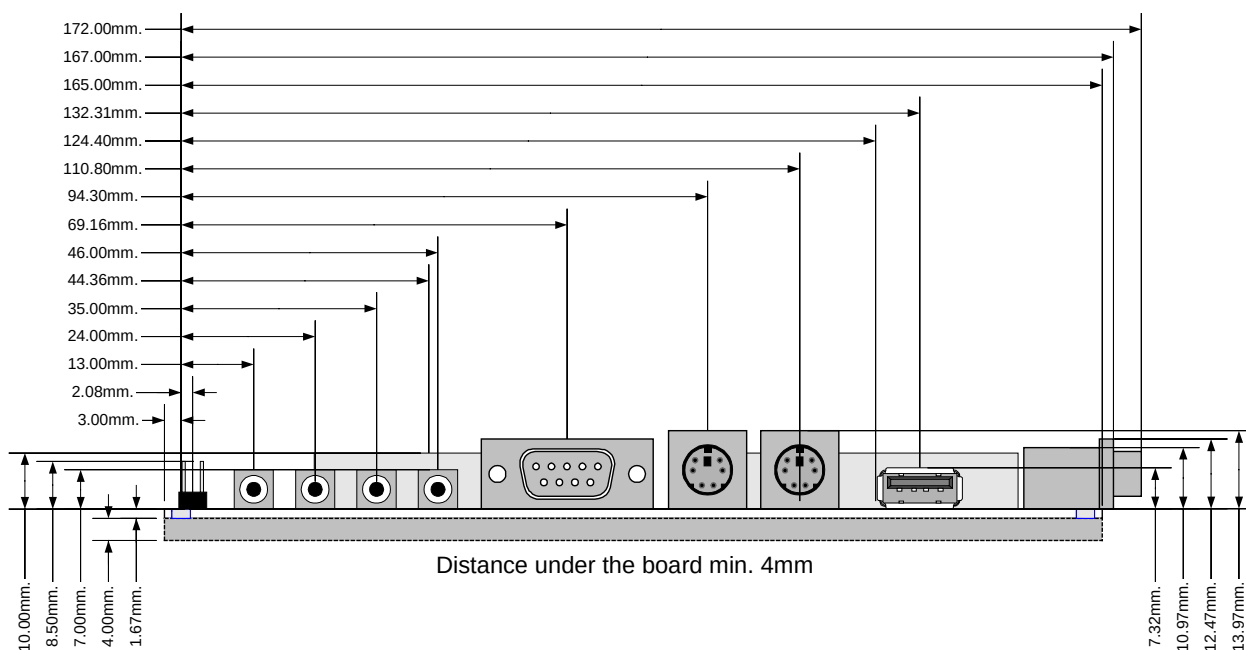
Connector position on REMMI-R figure 2

4.8.2.3 HOLE POSITIONS ON REMMI-R



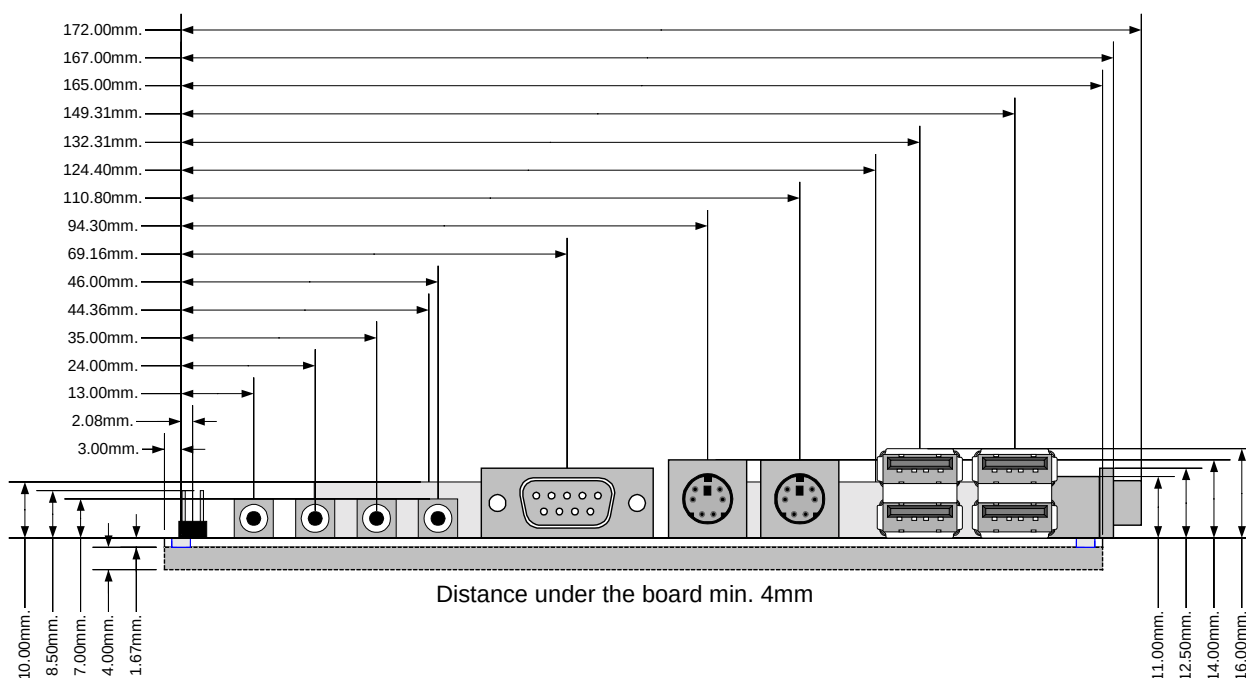
Hole positions on REMMI-R

4.8.2.4 HEIGHT OF THE REMMI-R WITH SINGLE USB CONNECTOR



Height of the REMMI-R with single USB connector

4.8.2.5 HEIGHT OF THE REMMI-R WITH DUAL USB CONNECTORS



Height of the REMMI-R with dual USB connectors

4.9 SERIAL INTERFACE (RS232) FEATURES

4.9.1 INTRODUCTION

There are many different options to use the RS232 interface on the **REMMI-R**. The REMMI concept support the signals RxD and TxD. Hardware handshake or the other modem signals are not available. The RxD and TxD signals are available on the **REMMI-R** on different connectors and with different voltage levels (RS232 level and TTL level).

IMPORTANT

Be aware that the RS232 serial interface is a point to point interface. Therefore only one device from the REMMI-R can be connected to the host system. If you use of the flash controller or the TTL signals on the "General Purpose Signals Connector", no other device can be attached on the RS232 voltage level connectors, and vice versa.

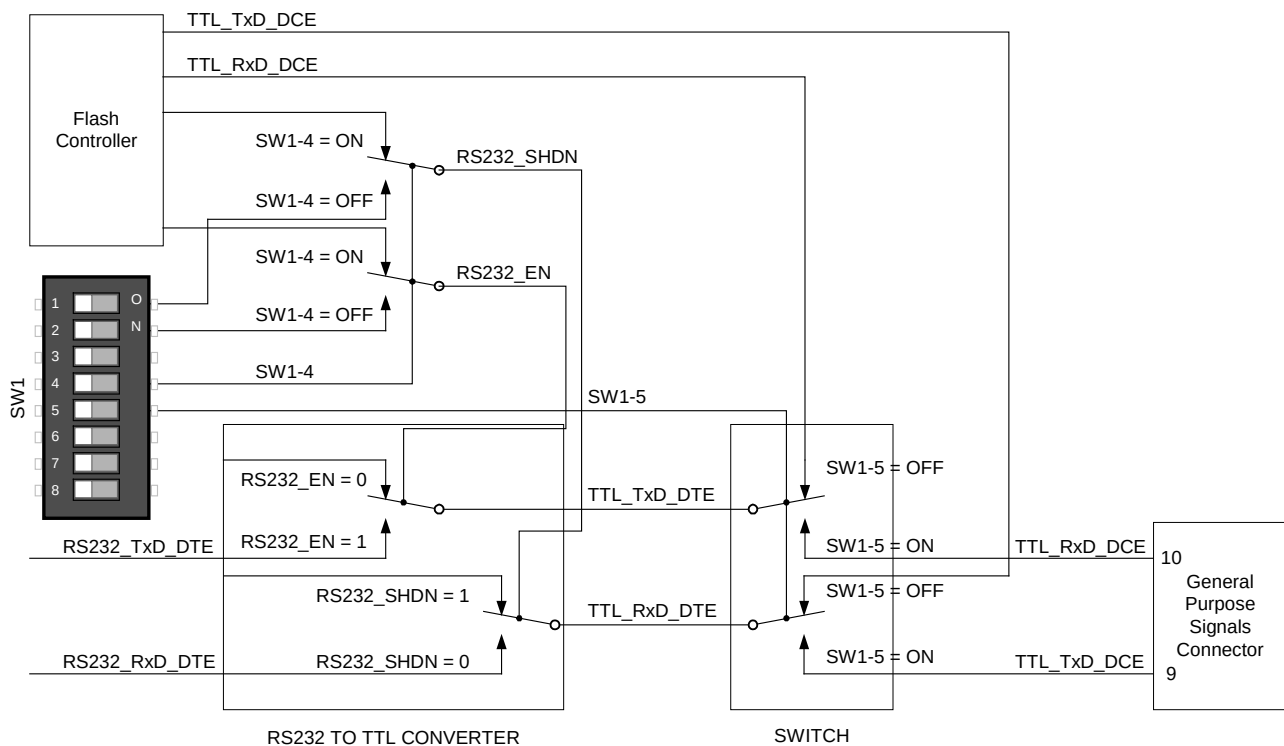
4.9.2 RS232 VOLTAGE LEVEL CONNECTORS

The serial interface signals are always connected to the "Serial Interface Connector" and the "Touch Option Connector".

4.9.3 TTL VOLTAGE LEVEL CONNECTOR

The serial interface signals are available on the "General Purpose Signals Connector". The onboard flash^{*1} controller can also be used to communicate over the serial interface with the host system. The "SCHEMATIC DIAGRAM 4.9.4" shows how to connect either the flash controller or the serial interface signals on the "General Purpose Signal Connector" to the host system. The signals RS232_RxD_DTE and RS232_TxD_DTE are the serial interface signals also connected to the "Touch Option Connector" and the "Serial Connector".

4.9.4 SCHEMATIC DIAGRAM



Note: *1: For using the flash controller with the serial interface some software has to be written for the flash controller.

4.10 BRIGHTNESS AND CONTRAST ADJUSTMENT

4.10.1 INTRODUCTION

Depending on the light of the surrounding where the LCD display is used, the brightness eventually needs to be adjusted. For the TFT-panel the backlight is used to adjust the brightness. With the STN / DSTN there is also a "Contrast" signal used to select the brightness. Today TFT panels are far more often used and therefore we describe TFT panels in this manual.

4.10.2 ELECTRICAL CONSIDERATIONS

The " BRIGHTNESS" signal on the Backlight Inverter Connector can be adjusted from 0 to 5V. The default setting is 2.5V.

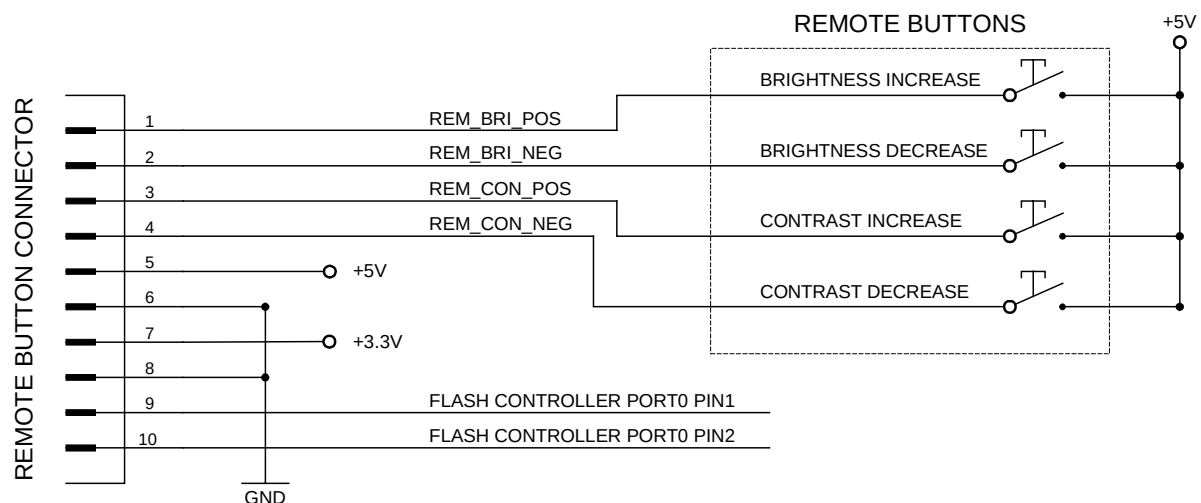
4.10.3 ADJUSTMENT POSSIBILITIES

4.10.3.1 ON BOARD BUTTONS ON REMMI-R

With the on board buttons the brightness can be adjusted easily. While keeping the button pressed, after a delay time the brightness in-/decreases automatically. For fine tuning press the specific button repeatedly until the right brightness is set.

4.10.3.2 FROM REMOTE BUTTONS TO CONNECTOR ON REMMI-R

The remote buttons work alike the once on board. See the scheme below for connection information:



4.10.3.3 FROM REMOTE HOST

This option can only be used if supported by the host system. For this reason there are two general purpose signals available on the **REMMI-T**. CTRL2 and CTRL3 are used to adjust the panel contrast and/or brightness from the host system. The signals are edge sensitive and are assigned as following:

CTRL2	CTRL3	Action
0	0	No change
0	↑	brightness +
1	↓	brightness -
↑	0	contrast +
↓	1	contrast -
1	1	No change

REMARK: That an edge is detected the signals have to be stable in the new state for at least 0.5ms. No edge is detected if the signals change together within 100us.

4.11 VARIABLE VOLTAGE SELECTION

4.11.1 INTRODUCTION

Besides the +5V voltage (used for **REMMI-R**, **REMMI-T**) and the 3.3V voltage (used only for **REMMI-T**), the REMMI modules uses a variable voltage. There is the possibility to give a selection of up to four different voltage levels, supported from the host system. From those, the right voltage level can be chosen on the **REMMI-R**. See the scheme diagram below for more information.

4.11.2 ELECTRICAL CONSIDERATIONS

The voltage selection is initialized after reset. After a delay of 3sec, either the right voltage is applied from the host system to the **REMMI-R** or no voltage is applied and the feature is turned off. The voltage selection circuit on the host side has to control the selected voltage applied. The max. power supplied by the host system for the VCC_VAR voltage is 10W.

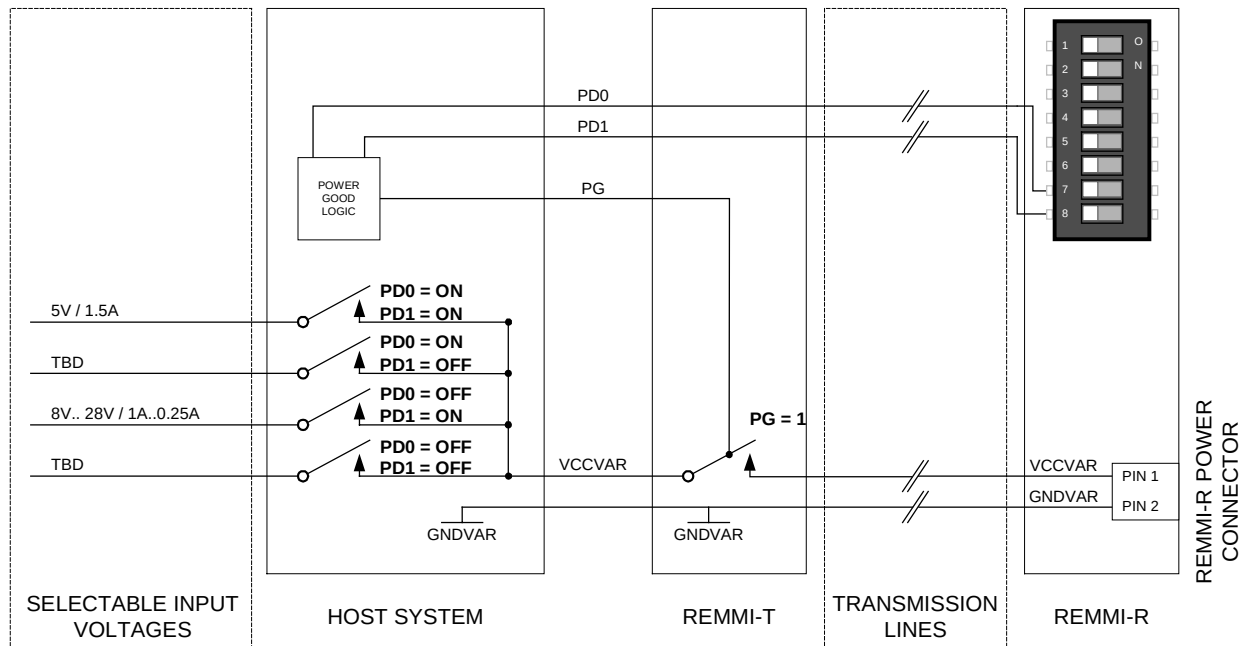
IMPORTANT

Be aware that if you use the REMMI modules in an other system than the xIP from MPL, that your voltage selection circuit has to control, if the right voltage is applied according to the selection. The variable voltage from the host, has to be turned off if the selected voltage doesn't have the proper level.

The following voltage level are defined:

SW1-7	SW1-8	Voltage VCC_VAR Selection
ON	ON	5V $\pm$ 5%
ON	OFF	TBD
OFF	ON	8V – 28V $\pm$ 10%
(OFF)	(OFF)	TBD

4.11.3 SCHEMATIC DIAGRAM



If the PG (Power Good) signal is high, the selected VCC_VAR (REMMI-T input) voltage is put through to the **REMMI-R**.

4.11.4 INTENDED APPLICATION

This feature has mainly built in the system to supply the LCD display backlight inverter with power from the host system. This solution allows to supply the whole **REmote MMI (REMMI)** interface from the host system if the needed power is less than 10W. This feature can also be used for many other application that use less than 10W total power.

4.12 TOUCH OPTION

4.12.1 INTRODUCTION

The “Touch Option” can be used to attach a touch screen to the system.

4.12.2 ELECTRICAL CONSIDERATIONS

There are many different kind of touch controllers, using also many different kind of interface protocols to connect the touch screen to the system. The **REMMI-R** supports two of those:

- Touch controller interface over RS232 (if touch controller only uses RxD and TxD signals)
- Touch controller interface over PS/2 (mouse)

If you use the serial interface (RS232), the Serial Connector can't be used and the DIP-switch has the following setting:

- SW1-4 = OFF
- SW1-2 = ON
- SW1-3 = OFF

If you use the PS/2 (mouse) interface, the external Mouse Connector can not be used.

For more information please refer to the touch controller manual.

4.13 FEATURE FLASH CONTROLLER

The on board flash controller is mainly used for the panel brightness and contrast adjustment. However there is still the possibility to use it for other applications as well. The serial TTL level interface, allows communication to the host or, if the flash controller is used as a host, to the General Purpose Signals Connector. For customer applications, the flash controller may be usable, if the it doesn't interfere with the main program.

5. TRANSMISSION CABLE

5.1 PARTS

The parts needed to connect the **REMMI-T** and the **REMMI-R** together are listed bellow:

- Two HD-Sub 25 pin male connector in a conductive cover

5.2 LENGTH

The cable length is restricted to 15m for the LCD displays with a resolution up to 1024x768 (XGA). If the USB interface is used, the max. length is 5m, according to the USB specification V1.0.

Because of the different cable quality, MPL can not be made reliable of pixel errors on the LCD display. To solve those problems, reduce the cable length or us a better cable quality from another manufacturer.

5.3 ELECTRICAL SPECIFICATION

5.3.1 PANELLINK® INTERFACE

- 4 twisted pairs
- Each pair single shielded
- Shielded as a hole cable
- CAT5 cable
- AWG 28
- Characteristic impedance $Z_0 = 100 \text{ Ohm} \pm 15\%$

SIGNAL PAIR DEFINITION

Pair	Signal	Description
1	PL_G-	PanelLink® green- signal
1	PL_G+	PanelLink® green+ signal
2	PL_R-	PanelLink® red- signal
2	PL_R+	PanelLink® red+ signal
3	PL_B-	PanelLink® blue- signal
3	PL_B+	PanelLink® blue+ signal
4	PL_CL-	PanelLink® clock- signal
4	PL_CL+	PanelLink® clock+ signal

REMARK: It is important to stay to the „SIGNAL PAIR DEFINITION“ to increase signal immunity against interferences and improve picture quality.

5.3.2 USB INTERFACE

- 1 twisted pair shielded
- CAT5
- AWG 28
- Characteristic impedance $Z_0 = 90 \text{ Ohm} \pm 15\%$

SIGNAL PAIR DEFINITION

Pair	Signal	Description
1	USB-	USB- line
1	USB+	USB+ line

REMARK: It is important to stuck to the „SIGNAL PAIR DEFINITION“ to increase signal immunity against interferences and transmission quality.

5.3.3 SERIAL INTERFACE (RS232)

- 1 twisted pair
- AWG 24

SIGNAL PAIR DEFINITION

Pair	Signal	Description
1	RxD	Receive line RS232 (DTE)
1	TxD	Transmission line RS232 (DTE)

REMARK: It is important to stick to the „SIGNAL PAIR DEFINITION“ to increase signal immunity against interferences and transmission quality.

5.3.4 PS/2 INTERFACE (MOUSE AND KEYBOARD)

- 2 twisted pairs
- AWG 24

SIGNAL PAIR DEFINITION

Pair	Signal	Description
1	KCLOCK	Keyboard clock line
1	KDATA	Keyboard data line
2	MCLOCK	Mouse clock line
2	MDATA	Mouse data line

REMARK: It is important to stick to the „SIGNAL PAIR DEFINITION“ to increase signal immunity against interferences and transmission quality.

5.3.5 REMMI-R POWER SUPPLY

Each twisted pair includes a VCC and a GND signal.

- 2 twisted pairs
- AWG 22
- Current load: min. 1A a pair

SIGNAL PAIR DEFINITION

Pair	Signal	Description
1	VCC	+ 5V power
1	GND	Ground
2	VCC	+ 5V power
2	GND	Ground

5.3.6 VARIABLE POWER SUPPLY

Each twisted pair includes a VCC_VAR and a GND_VAR signal.

- 3 twisted pairs
- AWG 22
- Current load: min. 1A a pair

SIGNAL PAIR DEFINITION

Pair	Signal	Description
1	VCC_VAR	Variable power supply
1	GND_VAR	Variable ground
2	VCC_VAR	Variable power supply
2	GND_VAR	Variable ground
3	VCC_VAR	Variable power supply
3	GND_VAR	Variable ground

6. INTERNET LINKS^{*1}

- MPL AG
<http://www.mpl.ch>
- ATMEL AT98S8252
<http://www.atmel.com/products/prod71.htm>
- SILICON IMAGE
<http://www.siimage.com>
- LG.PHILIPS LCD
<http://www.lgphilips-lcd.com:8888/English/product/p.html>

Note: *1: Links may have changed in the meantime. The latest links can also be found on the MPL homepage <http://www.mpl.ch/>

7. SUPPORT INFORMATION

7.1 MPL AG

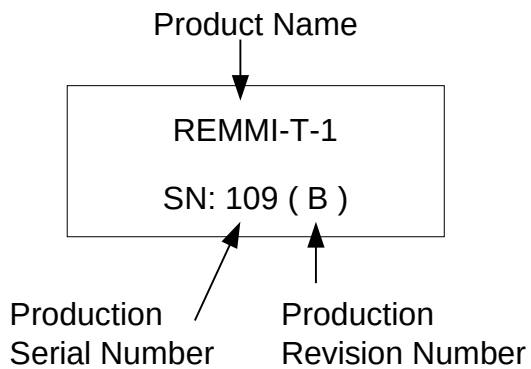
In case of questions contact MPL AG or your local distributor.

MPL AG homepage: www.mpl.ch

Email address: support@mpl.ch

7.2 PRODUCTION SERIAL AND REVISION NUMBER

To get the actual production revision number of your device, please see the label on the **REMMI-R** or the **REMMI-T**.



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MANUAL REVISION INFORMATION

Date	Revision No.	Remarks
June 2000	A	This manual reflects the following revisions of the REMMI modules: REMMI-R Rev. A REMMI-T Rev. A REMMI-5 Rev. A REMMI-RS Rev. A
December 2001	B	This manual reflects the following or higher revisions of the REMMI modules: REMMI-R Rev. B REMMI-T Rev. B

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All implied warranties on the product and manuals, including implied warranties or merchantability and fitness for a particular purpose, are limited in duration to twelve (12) months from the date of the original retail purchase of this product.

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